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(19)(CA) **APPLICATION FOR CANADIAN PATENT** (12)

(54) Changing-Advertisement Display

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(54) Title: CHANGING-ADVERTISEMENT DISPLAY

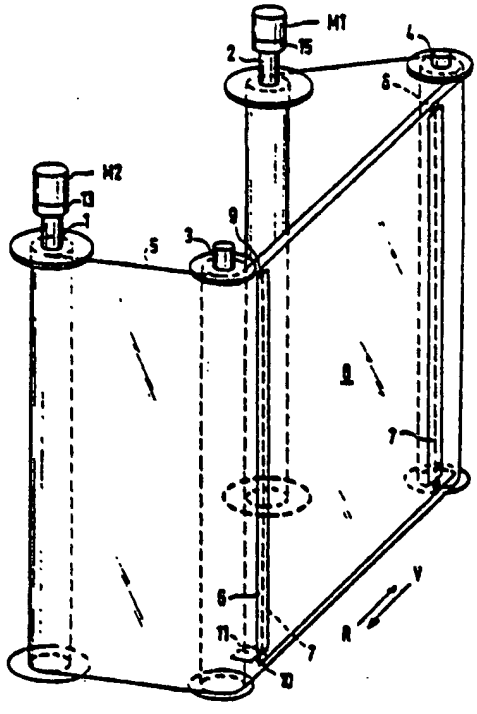
(54) Bezeichnung: WECHSELPLAKATGERÄT

(57) Abstract

The changing-advertisement display disclosed has a carrier band which can be unrolled in a first direction from a first roller on to a second roller or in a second direction from the second roller on to the first roller. Advertisements are attached at pre-determined positions to the carrier band, the positions being indicated by means of marks which can be detected by a sensor to produce position signals for the movement of the carrier band. A specially controlled roller drive enables the carrier band to be moved at a constant speed between the rollers over it whole length in both directions and held taut at all times.

(57) Zusammenfassung

Die Erfindung betrifft ein Wechselplakatgerät, bei dem eine Trägerfolie in einer ersten Bewegungsrichtung von einer ersten Wickelwalze abrollbar und auf eine zweite Wickelwalze aufrollbar oder in einer zweiten Bewegungsrichtung von der zweiten Wickelwalze abrollbar und auf die erste Wickelwalze aufrollbar ist, bei dem auf die Trägerfolie in vorgegebenen Positionen Plakate aufbringbar sind, und bei dem diese Positionen mit Markierungen versehen sind, die mittels einer Sensoreinrichtung zum Abgeben von Positionssignalen für die Bewegung der Trägerfolie feststellbar sind. Mit einem besonders gesteuerten Antrieb der Wickelwalzen wird erreicht, daß die Trägerfolie zwischen den Wickelwalzen über den gesamten Ablauf in beiden Bewegungsrichtungen gleichmäßig bewegt und stets gespannt gehalten wird.



Changing-Advertisement Display

The invention relates to a variable advertising poster device, where a first backing foil can be unwound from a winding roller in a first direction of motion and can be wound on a second winding roller or, in a second direction of motion, can be unwound from the second winding roller and wound on the first winding roller, where posters can be placed on the backing foil at predetermined positions and these positions are provided with markers, which can be detected by means of a sensing device for emitting position signals for movements of the backing foil.

A variable advertising poster device of this type is known from WO 89/03 570. There, the backing foil is guided between the two winding rollers via two frontally disposed deflecting rollers, the position of which approximately corresponds to the width of the poster. These deflecting rollers lead the backing foil with the posters in back of a transparent pane of the housing of the device. The sensing device indicates when a correct position of the poster has been achieved in order to temporarily stop the drive of the backing foil, during which time the displayed poster can be viewed. Thus, the backing foil is displaced in steps from one poster position to another poster position and both directions of movement of the backing foil are utilized. Considerable difficulties arise for the drive of the winding rollers in case of large-size posters and with a plurality of posters on the backing foil, because it is no longer sufficient to drive only the winding roller on which the backing foil is rolled at the time. With the drive it is not assured that the poster which is in the display position is not evenly stretched during the entire run behind the pane. Also, the speed of movement of the backing foil changes with increasing roller diameter of the winding roller on which the foil is wound.

A winding device for transporting a film is known from DE 28 22 392 A1, which has two winding rollers, to each one of which an electric motor is assigned which can be driven in both directions of rotation by reversing the potential of the current. In this case the film is continuously driven.

A drive device for a film reader is known from DE 30 50 464 C2, which also has two winding rollers. An electric motor, which can be driven in both directions of rotation by a reversal of the polarity of the current is assigned to each of the winding rollers. The polarities of the currents have been selected here in such a way that the electric motor which is respectively placed upstream in the direction of movement pulls the film, while the electric motor which is respectively placed downstream in the direction of movement brakes the film. In addition, individual motor controls are disposed in the two electric motors, which control the electric motors in respect to polarity and intensity of the current as a function of the winding diameter of the film respectively existing on the two winding spools in such a way that the speed of movement of the film is approximately constant independently of the direction of movement and the position attained. In this known drive device, too, the film is continuously moved. For this reason this drive device is also not suited to a variable advertising poster device where the backing foil has posters in predetermined positions, so that the winding diameter does not change continuously, but in each case depends on how many posters are fitted on the backing foil. In addition, regardless of this it is necessary in a variable advertising poster device that each poster position can be triggered and the backing foil can be positioned accordingly.

It is the object of the invention to provide a variable poster device of the above mentioned type so that, with a drive device known from the film technology, a controlled, step-by-step

advancing movement of the backing foil in both directions of movement into a desired position becomes possible, and that the non-continuous placement of posters on the backing foil and the resulting irregularities of the winding diameters impede the exact positioning of the posters.

This object is attained in accordance with the invention in that an electric motor, which can be driven in both directions of rotation by a polarity reversal of the current is assigned to each winding roller; that the polarities of the currents of the electric motors in each direction of movement of the backing foil are selected in such a way that the electric motor which is respectively placed upstream in the direction of movement pulls the backing foil, while the electric motor which is respectively placed downstream in the direction of movement brakes the backing foil; that an individual motor control with a program memory is assigned to each electric motor, which regulates the respective polarity and intensity of the current of the assigned electric motor as a function of the position attained by the backing foil in such a way that the speed of movement of the backing foil is approximately constant independently of the direction of movement and the attained position, where the current of the electric motor assigned to the upstream winding coil is reduced step-by-step with increasing position in the direction of movement, while the current of the electric motor assigned to the downstream winding coil increases step-by-step; that each electric motor is connected via a gear with the assigned winding roller and is connected with the assigned motor control via a position feedback; that the sensing device emits a reference position signal when the backing foil has reached an end position in the direction of movement beyond the last position in this direction of movement, and emits a respective position signal when one of the positions has been attained; that the sensing device supplies the reference position

signal and the position signals to both motor controls; that the motor controls control the positions via the position feedbacks and pass on the reference position signal and the position signals to a central processor; that each motor control has stored current values associated with all positions of the backing foil in both directions of movement for the assigned electric motor, together with an indication of the respective polarity, in the assigned program memory and, that the processor supplies the motor controls with an advance step signal or a reverse step signal which can be used for advancing the backing foil in one of the two directions of movement.

It is possible by means of the step-by-step adaptation of the currents as a function of the attained position to compensate for the irregular change of the winding diameters in the course of the movement of the backing foil provided with posters, so that an approximately constant speed of movement of the backing foil is achieved in spite of this. A simple means of control is provided by the position returns of the motor controls to determine whether the control signals supplied by the processor have been processed by the motor controls in such a way that the position issued by the processor has in fact been achieved, i.e. there is a kind of synchronism between the processor and the motor controls. It is required for this that the processor and the motor controls are supplied with the reference position signal and the position signals. Then the motor controls as well as the central processor are exactly informed of the respectively achieved position, so that it becomes possible to move into any arbitrary position in one or the other direction of movement from any other arbitrary position.

In accordance with another embodiment a sort of continuous movement past several positions is achieved in that the processor supplies the motor controls, in addition to the advance step

signal, with an advance winding signal, which can be used for continuous movement of the backing foil in the first direction of movement or, in addition to the reverse step signal, with a reverse winding signal, which can be used for the continuous movement of the backing foil in the second direction of movement.

In this connection it has been provided in accordance with an embodiment that the reference position signal, the position signals, the advance step signal, the reverse step signal, the advance winding signal and the reverse winding signal are in the form of pulses, where the processor supplies the advance step signal, the reverse step signal, the advance winding signal and the reverse winding signal to the motor controls via associated control lines and an adaptation circuit.

Control is performed in detail in such a way that by means of the pulse-shaped advance step signal the processor triggers the two motor controls to advance the backing foil by one position in the first direction of movement and that the motor controls retrieve the polarities and intensities of the currents for the electric motors required for this from their memories and supply them to the motors, and that the processor triggers the two motor controls by means of the pulse-shaped reverse step signal to reverse the backing foil by one position in the second direction of movement, and that by means of the pulse-shaped advance winding signal and the simultaneously present advance step signal the processor triggers the two motor controls to run the backing foil continuously in the first direction of movement, and that by means of the reverse winding signals and the simultaneously present reverse step signal the processor triggers the two motor controls to run the backing foil continuously in the second direction of movement and that the motor controls retrieve the polarities and intensities of the currents for the electric motors required for this from their memories and supply them to the motors.

The operation can be defined in a simple manner in that the processor is programmable for the various poster sequences and that the individual programs can be selected with time delay.

The invention will be described in detail by means of an exemplary embodiment illustrated in the drawings. Shown are in:

Fig. 1 the schematic structure of the variable advertising poster device,

Fig. 2 a block diagram of the drive,

Fig. 3 the current path in the two electric motors in the first direction of movement of the backing foil, and

Fig. 4 the current path in the two electric motors in the second direction of movement of the backing foil.

The variable advertising poster device in accordance with the invention has a backing foil 1 which can be moved between the two winding rollers 1 and 2 in a first direction of movement V and in a second direction of movement R. The winding rollers 1 and 2 are here driven by electric motors M1 and M2. At the start of unwinding in the direction of movement V, the backing foil 5 is wound up on the winding roller 1 and is unwound by the winding roller 2. At the start of unwinding in the direction of movement R, the backing foil 5 on the winding roller 2 and is unwound by the winding roller 1. The end positions of the backing foil 5 can be indicated by special markings which are different from the markings 10 of the positions (poster positions) 1 to n by their distance and, for example, in width from the base markings for the end positions.

Between the two winding rollers 1 and 2, the backing foil 5 is led over deflecting rollers 3 and 4 which are disposed directly behind a transparent pane of a device housing. The distance between the deflecting rollers 3 and 4 is adapted to the width of a poster 8 which is held on the front of the backing foil 5 in retaining strips 7 which are disposed on the backing foil 5 at a

distance corresponding to the width of the poster 8. The width of the backing foil 5 is a little more than the height of the poster 8, so that it is possible to dispose the markings 10 on the lower edge, for example. The fastening strips 7 are connected with the backing foil 5 only by a bridge 9, so that together with the backing foil 5 they form groove-like recesses on both sides for inserting the poster 8. The poster 8 can also be maintained electrostatically against the backing foil 5.

The drive of the winding rollers 1 and 2 takes place via gears 13 and 15, which are connected downstream of the electric motors M2 and M1 and connected with the winding rollers 1 and 2. If the backing foil 5 is moved in the direction of movement V, the electric motor M1 drives the winding roller 2 in a counterclockwise direction. The backing foil 5 is being pulled and wound on the winding roller 2. The electric motor M2 is supplied with a current, which attempts to drive the winding roller 1 in a clockwise direction, but is unable to do this because the moment of traction on the backing foil 5, which is being transferred by the electric motor M1 to the backing foil 5, is greater and only permits a movement of the backing foil 5 in the direction of movement V. But the result of this is that the electric motor M2 brakes, which leads to tightening the backing foil 5 between the winding rollers 1 and 2 and particularly between the deflection rollers 3 and 4.

If the backing foil 5 is being moved in the direction of movement R, the electric motor M2 pulls the backing foil 5, while the electric motor M1 brakes the backing foil 5 and keeps is tight by this. The electric motor M2 again turns in a clockwise direction and the electric motor M1 in a counterclockwise direction. However, the intensity of the currents changes as a function of the position attained and thus of the winding

diameters of the winding rollers 1 and 2 attained at that time. This will be explained in detail by means of Figs. 3 and 4.

What remains to be mentioned is that in the exemplary embodiment in Fig. 1 the take-up and the take-off of the backing foil 5 takes place on the outsides of the winding rollers 1 and 2 which face away from each other. But it is also possible to move the take-up and the take-off of the backing roller 5 to their insides facing each other. In this case the directions of rotation of the winding rollers 1 and 2 and thus the polarities of the currents through the electric motors M1 and M2 are respectively reversed. It is possible by the appropriate choice of the directions of rotation and the polarities of the currents to place the take-up and the take-off of one winding roller on the outside and of the other winding roller on the inside.

As shown in the block diagram in accordance with Fig. 2, a sensing device 11 transmits a reference position signal io and position signals ip to an adaptation circuit IF, which transforms them and passes them on to the motor controls MS1 and MS2.

The reference position signal io is emitted when an end position of the backing foil 5 in the first or second direction of movement V or R has been reached. This reference position signal io reaches the motor controls MS1 and MS2 and through them a central processor P and is used for setting a defined initial position, from which the positions 1 to n are counted and identified by means of the markings 10. When passing over a marking 10, the sensing device 11 emits a pulse-shaped position signal ip. These position signals ip are counted in the motor controls MS1 and MS2 and in the processor P, so that the respective position 1 to n which has just been set can be identified in these units. The motor controls MS1 and MS2 themselves are controlled in that they have a position feedback RF

and detect the setting into a new position 1 to n by means of this.

The processor R can be programmed for different poster sequences, where the poster sequences can be selected with time delay automatically. Because the processor R receives the reference position signal io and the position signals ip, the selected position is known to it. For controlling the operation, the processor P can emit four signals in accordance with the actual poster sequence. These are an advance step signal Bv, a reverse step signal Br, an advance winding signal Spv and a reverse winding signal Spr. All these signals are transmitted as pulses via separate lines via the adaptation circuit IF to both motor controls MS1 and MS2.

Now, if the advance step signal Bv is present, it is evaluated in the two motor controls MS1 and MS2 for advancing the backing foil 5 by one position in the direction of movement V. To do this and with the knowledge of the set position, the polarities and the intensities of the currents Jm1 and Jm2 for the electric motors M1 and M2 are selected by the motor controls MS1 and MS2 in order to move the backing foil 5 at a practically constant speed into the next position in the preset direction of movement V. The sensing device 11 indicates reaching the new position. Further transmission of the advance step signal Bv depends on the poster sequence, in which the times for changing are also preset.

If, however, the processor P sends the reverse step signal Br to the motor controls MS1 and MS2, movement of the backing foil 5 by one position in the direction of movement R takes place in a similar manner. The motor controls MS1 and MS2 again draw the required currents in respect to polarity and intensity from their program memories, in which the currents for both directions of

movement V and R are preset for the positions to be set in accordance with their intensity and polarity.

If the processor P simultaneously transmits the advance step signal Bv and the advance winding signal Spv to the motor controls MS1 and MS2, this means continuous running of the backing foil 5 in the direction of movement V. The continuous running across the positions can take place without stopping or in steps. The motor controls MS1 and MS2 and the processor P are informed of the attained position by means of the position signals ip.

Continuous running of the backing foil 5 in the direction of movement R takes place in a similar manner if the processor P simultaneously transmits the reverse step signal Br and the reverse winding signal Spr.

The alternative may also be that only the advance winding signal Spv and the reverse winding signal Spr are sufficient for continuous running in the directions of moving V and R while, when the advance step signal Bv or the reverse step signal Br are additionally transmitted, step-by-step continuous running in the directions of movement V and R is performed.

In this connection, continuous running can also be used for moving to a predetermined position.

So that the speed of the backing foil 5 remains approximately constant, regardless of the position attained, and the backing foil 5 is continuously stretched between the winding rollers 1 and 2, triggering of the electric motors M1 and M2 in the direction of movement V takes place with currents in accordance with Fig. 3 and in the direction of movement R with currents in accordance with Fig. 4. In Fig. 3 it is assumed that the backing foil 5 has been completely wound on the winding roller 1 and that a positive current rotates a winding roller in a counterclockwise direction and a negative current in a clockwise direction. Because the winding roller 2 must pull the backing

foil 5 in the direction of movement V, the electric motor M1 is supplied with a positive current Jm1, while the electric motor M2 is supplied with negative current Jm2 in order to brake the winding roller 1. Fig. 3 now shows the required values of the currents Jm1 and Jm2 as a function of the positions in order to compensate for the changing winding diameters Dw of the winding rollers 1 and 2 in such a way that the backing foil 5 has an approximately constant speed between the winding rollers 1 and 2 when it is displaced from one position to another. The short start-up and stop time period for the electric motors M1 and M2 has not been considered here. For simplicity's sake, the dependencies of the currents Jm1 and Jm2 drawn in Fig. 3 have been assumed to be linear, because the rpm of the electric motors M1 and M2 is approximately proportional to the current supplied and the winding diameter Dw, together with the rpm, has an effect on the path of the backing foil 5 required for a poster change.

The functions Jm1 = f(Dw) and Jm2 = f'(Dw) can have an arbitrary form and can non-linearly predetermine the currents Jm1 and Jm2, which are changed in steps, required for the positions 1 to n. Fig. 3 now shows that at the start of the direction of movement V the current Jm1 is at a maximum and is reduced in steps from position to position, while the current Jm2 increases in steps from position to position, starting at zero.

In the direction of movement R, the current Jm2 starts with the maximum value and decreases in steps from position to position. It should be noted here that in this case the numbering of the positions of the backing foil 5 runs in the other direction, i.e. always in the direction of movement of the backing foil 5. Now the current Jm1 increases in steps, starting at zero.

It is attained in this way that the increase or decrease of the winding diameters Dw of the winding rollers 1 and 2 is compensated and that running of the backing foil 5 in both

directions V and R takes place evenly and with the backing foil 5 under tension between the winding rollers 1 and 2 over the entire movement path.

Claims

1. A variable advertising poster device, where a first backing foil can be unwound from a winding roller in a first direction of motion and can be wound on a second winding roller or, in a second direction of motion, can be unwound from the second winding roller and wound on the first winding roller, where posters can be placed on the backing foil at predetermined positions and these positions are provided with markers, which can be detected by means of a sensing device for emitting position signals for movements of the backing foil,

characterized in that

an electric motor (M1, M2), which can be driven in both directions of rotation by a polarity reversal of the current (Jm1, Jm2) is assigned to each winding roller (1, 2),

the polarities (+, -) of the currents (Jm1, Jm2) of the electric motors (M1, M2) in each direction of movement (V, R) of the backing foil (5) are selected in such a way that the electric motor (for example M1) which is respectively placed upstream in the direction of movement (for example V) pulls the backing foil (5), while the electric motor (for example M2) which is respectively placed downstream in the direction of movement (for example V) brakes the backing foil (5),

a motor control (MS1, MS2) with a program memory is assigned to each electric motor (M1, M2), which (MS1, MS2) with a program memory is assigned, which regulates the respective polarity (+, -) and intensity of the current (Jm1, Jm2) of the assigned electric motor (M1, M2) as a function of the position (1 ... n) attained by the backing foil (5) in such a way that the speed of movement of the backing foil (5) is approximately constant independently of the direction of movement (V, R) and the

attained position (1 to n), where the current (for example Jm1) of the electric motor (for example M1) assigned to the upstream winding coil (for example 2) is reduced step-by-step with increasing position (1 to n) in the direction of movement (V, R), while the current (for example Jm2) of the electric motor (for example M2) assigned to the downstream winding coil (for example 1) increases step-by-step,

each electric motor (M1, M2) is connected via a gear (13, 15) with the assigned winding roller (1, 2) and is connected with the assigned motor control (MS1, MS2) via a position feedback (RF);

the sensing device (11) emits a reference position signal (io) when the backing foil (5) has reached an end position in the direction of movement (V, R) beyond the last position (1 or n) in this direction of movement (V or R), and emits a respective position signal (ip) when one of the positions (1 to n) has been attained,

the sensing device (11) supplies the reference position signal (io) and the position signals (ip) to both motor controls (MS1, MS2),

the motor controls (MS1, MS2) control the positions (1 to n) via the position feedbacks (RF) and pass on the reference position signal (io) and the position signals (ip) to a central processor (P),

each motor control (MS1, MS2) has stored current values associated with all positions (1 to n) of the backing foil (5) in both directions of movement (V, R) for the assigned electric motor M1, M2), together with an indication of the respective polarity (+, -), in the assigned program memory and,

the processor (P) supplies the motor controls (MS1, MS2) with an advance step signal (Bv) or a reverse step signal (Br)

which can be used for advancing the backing foil (5) in one of the two directions of movement (V, R).

2. A variable advertising poster device in accordance with claim 1,

characterized in that

the processor (P) supplies the motor controls (MS1, MS2), in addition to the advance step signal (Bv), with an advance winding signal (Spv), which can be used for continuous movement of the backing foil (5) in the first direction of movement (V) or, in addition to the reverse step signal (Br), with a reverse winding signal (Spr), which can be used for the continuous movement of the backing foil (5) in the second direction of movement (R).

3. A variable advertising poster device in accordance with claim 2,

characterized in that

the reference position signal (io), the position signals (ip), the advance step signal (Bv), the reverse step signal (Br), the advance winding signal (Spv) and the reverse winding signal (Spr) are in the form of pulses, where the processor (P) supplies the advance step signal (Bv), the reverse step signal (Br), the advance winding signal (Spv) and the reverse winding signal (Spr) to the motor controls (MS1, MS2) via associated control lines and an adaptation circuit (IF).

4. A variable advertising poster device in accordance with claim 3,

characterized in that

by means of the pulse-shaped advance step signal (Bv) the processor (P) triggers the two motor controls (MS1, MS2) to

advance the backing foil (5) by one position in the first direction of movement (V), and

the motor controls (MS1, MS2) retrieve the polarities (+,-) and intensities of the currents (Jm1, Jm2) for the electric motors (M1, M2) required for this from their memories and supply them to the motors.

5. A variable advertising poster device in accordance with claim 3,

characterized in that

the processor (P) triggers the two motor controls (MS1, MS2) by means of the pulse-shaped reverse step signal (Br) to reverse the backing foil (5) by one position in the second direction of movement (V), and

the motor controls (MS1, MS2) retrieve the polarities (+,-) and intensities of the currents (Jm1, Jm2) for the electric motors (M1, M2) required for this from their memories and supply them to the motors.

6. A variable advertising poster device in accordance with claim 3,

characterized in that

by means of the pulse-shaped advance winding signal (Spv) and the simultaneously present advance step signal (Bv) the processor (P) triggers the two motor controls (MS1, MS2) to run the backing foil (5) continuously in the first direction of movement (V), and

the motor controls (MS1, MS2) retrieve the polarities (+,-) and intensities of the currents (Jm1, Jm2) for the electric motors (M1, M2) required for this from their memories and supply them to the motors.

7. A variable advertising poster device in accordance with claim 3,

characterized in that

by means of the reverse winding signal (Spr) and the simultaneously present reverse step signal (Br) the processor (P) triggers the two motor controls (MS1, MS2) to run the backing foil (5) continuously in the second direction of movement (R), and

the motor controls (MS1, MS2) retrieve the polarities (+,-) and intensities of the currents (Jm1, Jm2) for the electric motors (M1, M2) required for this from their memories and supply them to the motors.

8. A variable advertising poster device in accordance with one of claims 1 to 7,

characterized in that

the processor (P) is programmable for the various poster sequences, and

the individual programs can be selected with time delay.

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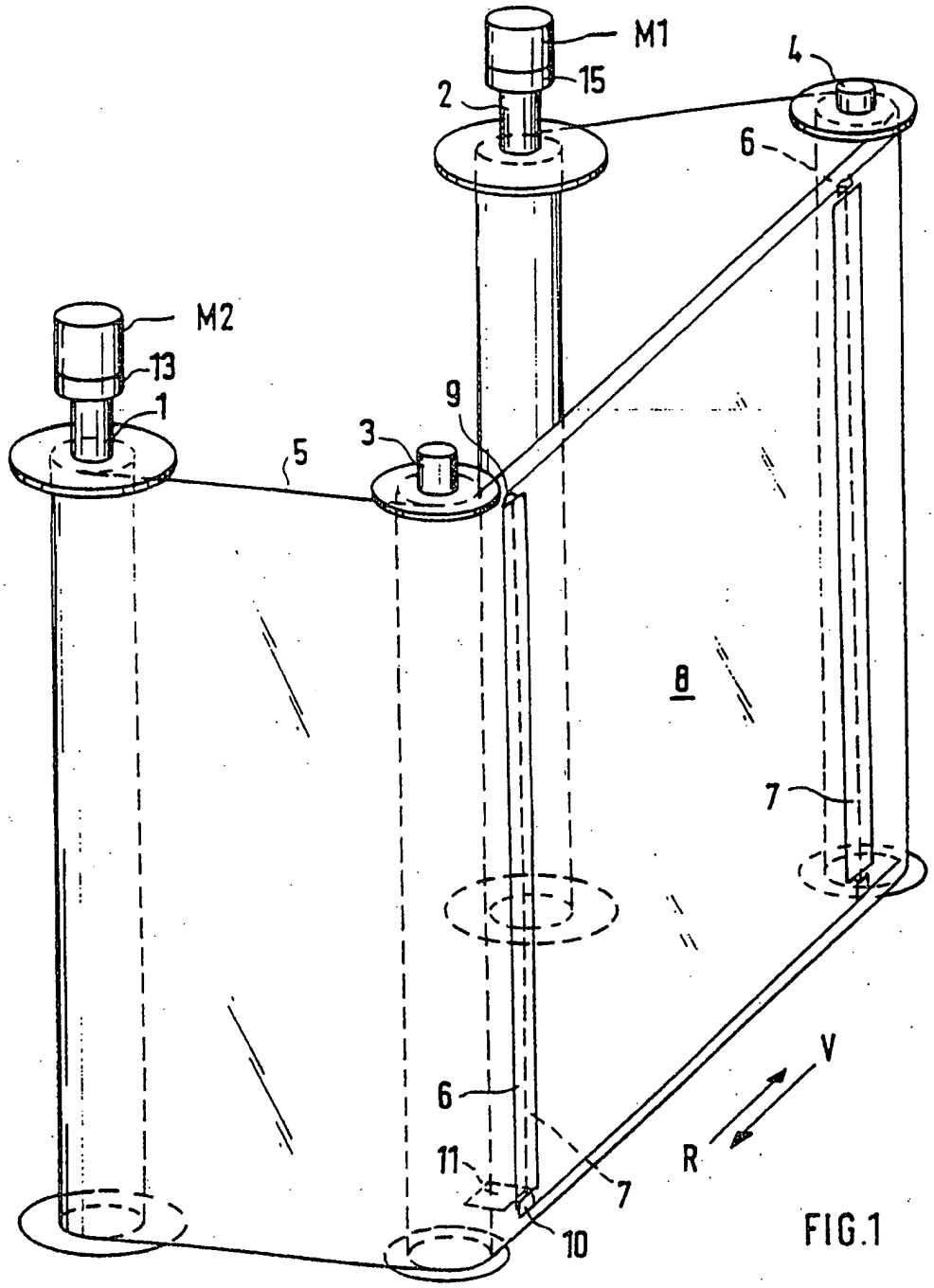

FIG.1

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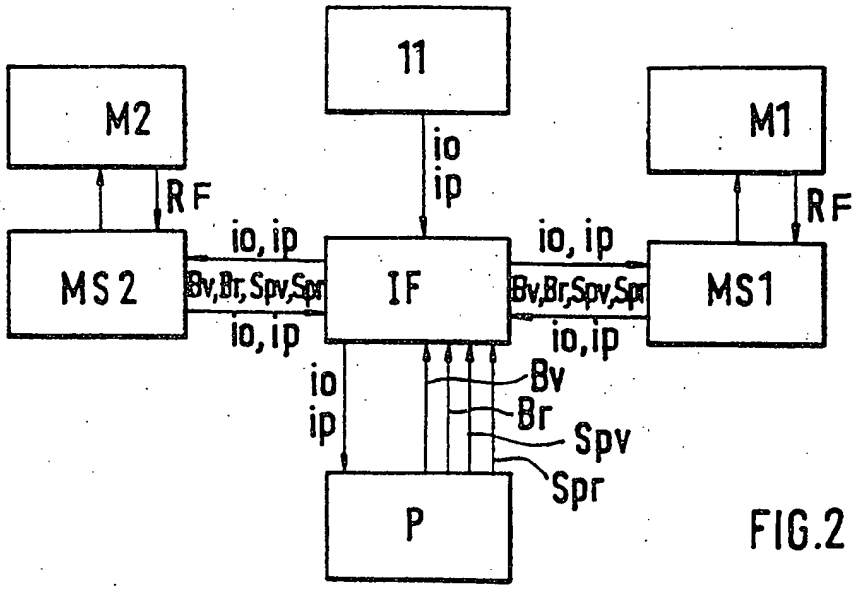

FIG.2

2089757

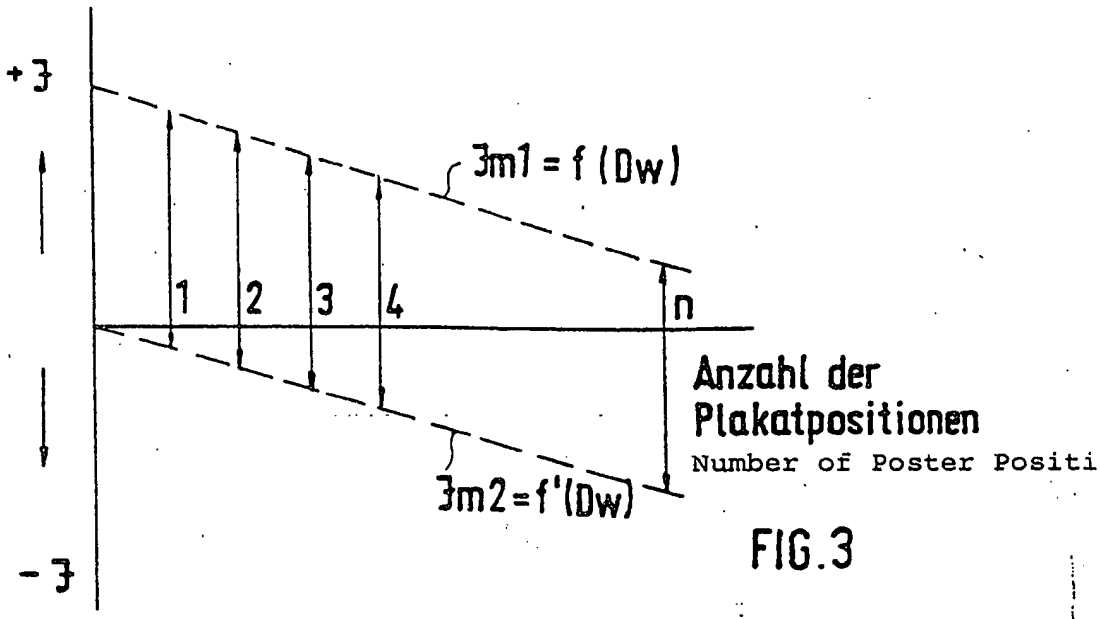

FIG.3

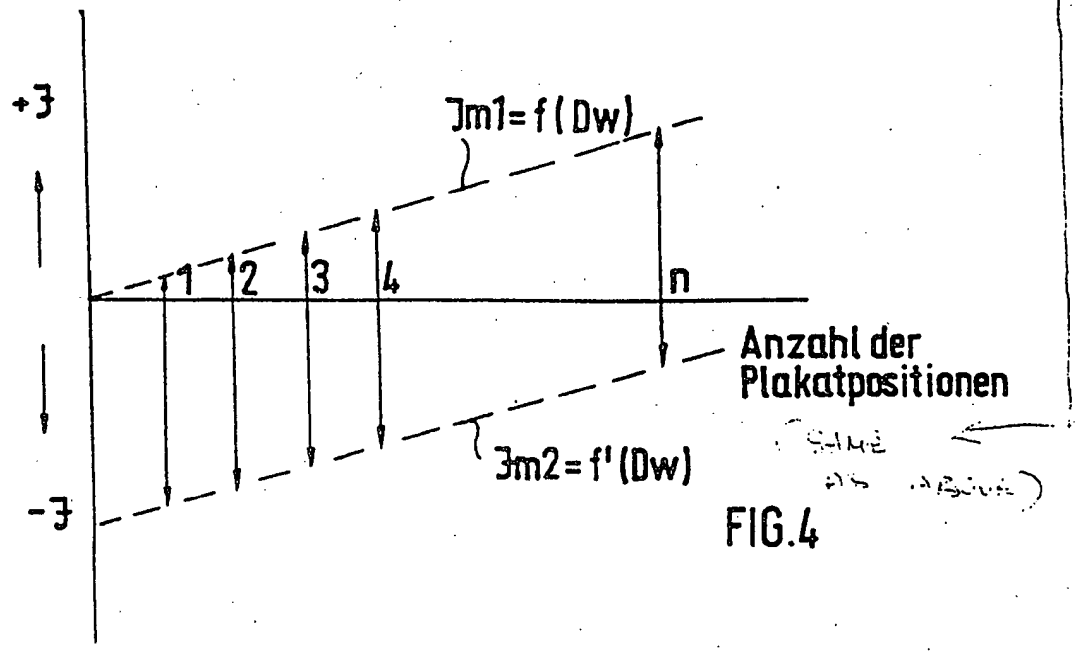

FIG.4